

UNS EE  
-352



**ECONOMIC COMMISSION FOR EUROPE**

**CONFERENCE ON PROBLEMS RELATING  
TO ENVIRONMENT**

**Prague, with a study tour to the regions of Ostrava,  
(Czechoslovakia) and Katowice (Poland),**

**2-15 May 1971**

Distr.  
RESTRICTED

ENV/CONF./H.10

14 April 1971

ENGLISH

Original: ENGLISH, FRENCH  
and RUSSIAN

MULTIPURPOSE USE AND CONSERVATION OF WATER RESOURCES IN THE USSR

Submitted by the Union of Soviet Socialist Republics

Prepared by a group of specialists of the USSR Ministry of Water Economy  
and Reclamation.

GE.71-8428



1. Concentration of the population in towns together with the rapid growth of industry and agriculture have changed the character and types of natural resource use. As a result, since the fifties the conservation, rehabilitation and improvement of the environment have become the most complicated problems of present-day life.
2. In dealing with this problem rational water utilization and the protection of water resources from pollution and exhaustion have assumed paramount importance in the USSR.
3. The Soviet Union is abundant in water resources. The mean annual flow of all the rivers totals 4,714 billion  $m^3$ , or about 12 per cent of the world's river flow. The main resources of lake fresh water are concentrated in 16 large lakes containing 26,174 billion  $m^3$ ; of this 23,000 billion  $m^3$ , or 88 per cent are in Lake Baikal. The tapped commercial ground water resources are estimated at 220 billion  $m^3$ . The total resources of surface and ground water, as well as the water found in the glaciers amount to 45,175 billion  $m^3$ ; of this the permanent resources equal 40,461 billion  $m^3$ , while those annually renewed, as has been mentioned, make up 4,714 billion  $m^3$ .
4. However, distribution of the water resources within the country's territory is quite irregular. For example, the major portion of the annual flow, i.e. 86 per cent, passes through the poorly developed and inhabited regions of the North, North-West and Far East. As for the western and southern regions of the country where industry and agriculture are concentrated, they receive only 14 per cent of the annual flow.
5. In the European part of the USSR where about 70 per cent of the population live, the river flow makes up 23 per cent of the country's total flow. More than a fourth (27 per cent) of the country's territory (much of it of great economic importance) is located in the zone of insufficient humidity, i.e., in the arid and desert regions. The flow in this particular area accounts for only 2 per cent of the total country's flow.
6. It should also be pointed out that the flow distribution within the year is extremely uneven. In some regions 90-95 per cent of the annual flow occurs within 1-3 spring months, while in the rest of the year very little water flows.
7. In the light of the above, the problems of a scientifically based utilization of the country's water resources have been a constant focus of attention of the USSR Government. The complex of measures aiming at a rational use of water and the protection of water resources from pollution and exhaustion could be developed only after the Great October Socialist Revolution, under conditions of the social ownership of the means of production and a balanced development of the national economy.



8. From the very first years of the Soviet State the use of water was declared free of charge. Millions of working people have benefitted from the great achievements of the new social system. State ownership of water resources has opened up wide possibilities for their planned and comprehensive use with a view to the development of the national economy, their protection from pollution and exhaustion and the carrying-out of scientifically-based water-economy measures, taking into account the present and future development of all branches of the national economy. In the planning and development of the water economy, these principles have been followed throughout the history of the Soviet State.

9. Prior to 1917 Russia's water development policy was not comprehensive and was concerned mainly with water transport paying little attention to the water supply of big towns, industry and agriculture. Already in 1920 the USSR adopted a State Plan for the Electrification of Russia (the GOELRO Plan) which became the basis for large-scale hydro-electric works in the basins of the Volga, Dnieper, Don, Volkhov and other rivers. The GOELRO Plan was not only a plan that envisaged the construction of hydro-electric stations. It was the first scientifically based plan for the use of the water resources in the interests of the entire national economy of the Soviet Union. Power generation was considered as a basis for the development of all other branches and their co-operation. It was a plan for the creation of the material resources of socialism in the USSR.

10. Before 1941 big hydro-electric stations had been constructed on the Dnieper, Svir, Volkhov and Volga rivers and a number of structures on the Moscow, Belomorsko-Baltiisky, Dnieper-Bug and other canals. Construction of the Moscow canal solved a number of problems including the water supply of Moscow and the creation of a deep waterway joining the Volga to the ports on the Caspian, Baltic and White seas. Completion of the Volga-Don canal made it possible to reach the ports on the Azov and Black seas.

11. Before the Russian Revolution a central water supply was provided in only 250 towns covering about 30-35 per cent of the dwellings. During the period of the first Five-Year Plans dozens of thousands of kilometers of water mains were laid, intake structures and water purification plants were built. Water supply for the population became an independent service with its own financial resources.

12. Great success was achieved in irrigation and drainage. Already during the Civil War the construction of irrigation systems was started in the Golodnaya (Hungary) steppes, the Mugan steppes and other regions. In the years of the first Five-Year Plans the irrigated area was considerably increased, exceeding by 1940 the irrigated area of the pre-Revolutionary period. This made it possible to extend the area under cotton thus solving the problem of providing the textile industry with its raw material.



13. Large-scale construction of irrigation systems and the development of new lands was carried out in the Golodnaya Steppe, in the Vakhsh and Fergana valleys and in the basins of the Chu, Kura, Araks, Surkhandarya and other rivers. In the same period serious works were started on the drainage of bogs and marsh-lands. By 1940 the drained area reached 5.5 mill.ha. This permitted a considerable increase in the gross yield of crops, thus providing the population and the processing industries with more agricultural products.
14. During the Great Patriotic War of 1941-1945 the entire country's national economy suffered tremendous damage, and the water economy in particular. The Dneprovsky hydro-electric station named after V.I. Lenin, structures on the Belomorsko-Baltiisky and Dnieper-Bug canals, on the Seversky Donetz and the Don rivers, and some other projects that were in the zone of hostilities were destroyed. Water supply and sewage facilities in the towns temporarily occupied by fascist Germany were almost entirely demolished. Irrigation development was stopped. By 1945 the area under irrigation decreased by 439,000 ha. and the drained area by 200,000 ha.
15. Restoration of the USSR water economy required great material and labour resources. It was only having a planned national economy that enabled the Soviet Union to eliminate in so short a time the ravages of war and to start construction of giant hydraulic multipurpose projects.
16. In recent decades hundreds of reservoirs were built in association with a complex of power, transport and other structures on the Volga, Kama, Dnieper, Angara, Ob, Yenisei and other rivers. About 1000 reservoirs function at present, the storage capacity of each being over 1 million m<sup>3</sup>. Their useful capacity totals 376 million m<sup>3</sup>. These reservoirs solve the problem of the multipurpose use of water resources for the supply of industry, power stations, irrigation, fisheries, navigation and recreation. The reservoirs greatly facilitate the control of floods that formerly inundated towns, rural communities and agricultural land. Flow regulation and the construction of large-capacity reservoirs have radically changed the environment and the economic potential of vast areas creating conditions for a significant increase in their productivity.
17. Early in 1970 the total installed capacity of all operating hydro-electric stations in the country was estimated at 29.7 million kW. The share of the hydro-electric power in the country's power balance was 19.5 per cent in 1969 by capacity and 16.6 per cent by power, or about 9 per cent of the world's power generation.



18. Large-scale irrigation and drainage works have been completed. The area at present irrigated is 10.7 million ha. which compared to the pre-Revolutionary period is a more than 2.7-fold increase. The area subject to drainage is 8.4 million ha, a 3-fold increase. Sufficient groundwater resources have been identified to supply the domestic and drinking water needs of more than 500 towns, industrial centres and other communities. These resources have been used as a basis for construction of large waterworks installations. In addition, the deepening of existing waterways and the construction of new canals has made it possible for large-capacity vessels to move from one basin to another.

19. At present the USSR water supply system does not ensure adequately the economic development of the more isolated regions (mainly in the zone characterized by a deficient water balance and in some river basins of the Central Economic Region, the Urals, etc.), even though the multipurpose use of water resources is in operation. It is necessary now to organize the diversion of water from the northern rivers to the south of the European part of the USSR and to the Aral Sea basin. On the basis of preliminary investigations and reports it is planned in 1971-1975 to work out feasibility studies and establish the priority of works on flow diversion of the northern and Siberian rivers to the southern regions of the country. The solution of this problem will make it possible to influence the level of the Caspian and Aral Seas to improve the Volga water balance and to overcome many difficulties in the water economy that cannot be solved at present.

20. An important step in the development of the country's water economy was the working-out of "The General Scheme for the Multipurpose Use and Conservation of the USSR's Water Resources". The "General Scheme" aimed at: revealing the regions with a critical water-supply i.e. those unfavourable for activities having large water requirements and favourable regions, i.e. those having excessive water resources; determination of the main lines of water supply development taking into account geographic allocation of production activities; revealing the present state of and planning programmes for, the protection of water resources from pollution and exhaustion; determination of the order of priority of hydraulic projects and planning the most important and promising ones fixing the magnitude of capital investments, etc.

21. Regional and catchment area schemes are being worked out for the multipurpose use and conservation of the land and water resources of the Aral and Azov Seas, of the northern zone of the Caspian Sea, of the Amudarya, Syrdarya, Kura, Kuban, Terek, Ural and other rivers. Thus, all the specific water economy developments in the Soviet Union conform to a single methodological basis, i.e., "The General Scheme for the Multipurpose Use and Conservation of the USSR Water Resources".



22. It should also be pointed out that in the Soviet Union control measures are exercised over the adverse effects of water: i.e. marshes, flood areas, soil salinity; destruction of river, reservoir and lake banks and sea walls; formation of mud and stone landslides; lake and reservoir silting; changing of river-beds and in this connexion constriction of navigation channels; leakage of fertilizers from fields and formation of gullies through erosion. Water control is effected through land drainage, flow regulation, leveeing and drainage of valuable land areas, channel deepening, afforestation, etc. The works aimed at reduction and elimination of flood damage and other adverse effects of water are closely integrated with other programmes of hydraulic construction.

23. In 1960 the USSR Council of Ministers adopted a Decree: "Measures on the Regulation and Protection of the USSR's Water Resources". In conformity with this Decree administrations responsible for water resource conservation were set up and measures elaborated for safeguarding the purity of water supplies.

24. The administrations thus formed were entrusted with carrying out the following: State supervision over the rational use of water by industrial enterprises and over the measures taken by these enterprises for the protection of water bodies from pollution and exhaustion; an inventory of surface and ground water resources and a programme for their utilization; the working out of water balances, the preparation of plans and regulations for the multipurpose use of the water resources, etc.

25. As prescribed by the Decree, the construction of industrial enterprises and their commissioning are allowed subject to their carrying out the whole complex of water conservation measures that guarantee the purity of the surface waters. The administrations responsible for the use and conservation of the water resources were granted the following powers: to stop the work of enterprises, workshops and units that pollute water bodies with their waste water; to impose penalties for infringements, etc.

26. All the republics have adopted decrees on the conservation of nature which include articles on the protection of water from pollution and on the responsibility of heads of departments and enterprises for preventing infringement of the Decree.

27. In the USSR the "Regulations on the Protection of Surface Water from Pollution with Waste Water" and the "Regulations on the Conservation of Coastal Areas" determine the quality requirements of water bodies used for domestic, fishery and industrial purposes and lay down the technical conditions for the discharge of waste water into water bodies, the methods of waste water treatment, the responsibility for the execution of the rules and the system of control. The appendix to these Regulations contains critical-permissible concentrations for 177 substances found in water bodies.



28. Conservation of water bodies involves the general public, especially the youth through the Lenin All-Union Young Communist League. Fulfilment of water conservation measures is subject to inspection in districts and individual republics. Shortcomings found at some enterprises in connexion with water protection measures are widely discussed in the local and central press.

29. According to existing regulations, construction firms are deprived of their bonus if they failed to complete construction of water treatment stations. Thus, in the USSR the protection of water from pollution is ranked as a national duty.

30. In order to deal more rapidly with the most urgent problems in the water economy, in 1968-1969 the USSR Council of Ministers approved a number of decrees aimed at the multipurpose use of water resources and their protection from pollution. As of 23 September, 1968 the USSR Council of Ministers adopted "The Measures on Prevention of Pollution of the Caspian Sea". Taking into account the fact the Caspian Sea is a unique fishery resource, the Council obliged the USSR Ministries and departments, as well as the appropriate administrations of the Union republics, to take the necessary steps to stop polluting the Sea and the main rivers that enter it with petroleum and other pollutants. To ensure the execution of the steps envisaged by the Decree a single inspectorate was established for the Caspian Sea conservation subordinate directly to the USSR Ministry of Water Economy and Land Reclamation, instead of several separate inspectorates subordinate to the Ministries of Water Economy and Land Reclamation of the various Republics.

31. The USSR Council of Ministers by the Decree of 7 March, 1969 "On the Measures for the Conservation and Efficient Use of the Natural Features of Lake Baikal" elaborated important nature conservation programmes, including water conservation. The Baikal Lake impounds 20 per cent of the world's fresh water and the composition of the water of this lake is unique. The Decree contemplates the execution of various studies in 1969-1971, with the participation of all ministries and departments interested, to define scientifically an appropriate programme for the use of the natural resources of the Baikal zone providing at the same time protection of the lake's water from pollution.

32. Considerable work has been done for appraising the measures necessary for rehabilitating the Baltic Sea.

33. In the Soviet Union the problems of water resource protection from pollution and exhaustion come under many ministries and departments.



34. The study of the pollution of surface water, i.e. of rivers, lakes and reservoirs comes under the Hydrometeorological Service which examines the chemical composition of the surface water and its changes under the influence of economic activity. The Hydrometeorological Service studies the processes of mixing and dilution of waste water in water bodies as well as the self-purification processes as influenced by the hydrological conditions, i.e., flow velocities, temperatures, channel characteristics, etc., physiochemical and microbiological peculiarities of water bodies. The Service also organizes the preparation and distribution of reviews concerning water resource pollution throughout the country.

35. To observe changes in the chemical composition of rivers and other water bodies the Hydrometeorological Service runs a chain of stations distributed all over the country with due regard to industrial, communal and agricultural waste and to the density of population. In addition to permanent observation stations the Service periodically arranges inspection expeditions covering particular regions and water resources, these inspections being of great importance to the national economy. Inspectors from all the hydrological stations are responsible for recording the level of pollution especially if serious.

36. The administrations of the Sanitary-epidemiological Service of the USSR Ministry of Health are responsible for the protection of water bodies that may affect public health and sanitation. Specifically, the health organizations are assigned the following duties:

- drawing-up the standards of hygiene of water bodies used for domestic and drinking water supply as well as for public amenities;
- systematic study of the hygienic condition of water bodies, working out the requirements for elimination of adverse effects on public health;
- evaluation of the hygienic efficiency of all measures aimed at the reduction of waste emptied into water bodies and if necessary, making demands for further extension of these measures (the latter being executed in co-operation with the administrations responsible for water resources and protection from pollution subordinate to the USSR Ministry of Water Economy and Land Reclamation).

37. As for the USSR Ministry of Health these tasks are carried out by republic, district, municipal and regional sanitary-epidemiological stations, while the more detailed studying of the problems is executed at Institutes of Hygiene and University Faculties of Medicine.



38. To ensure the conservation of fish reserves and to regulate fishing in USSR water bodies the fisheries inspectorate controls (together with the organizations responsible for water use and pollution control subordinate to the USSR Ministry of Water Economy and Land Reclamation and with the organizations of the Sanitary Service of the USSR Ministry of Health) the execution of conservation measures in the water bodies that are of fishery importance.

39. In conclusion, it should be mentioned that in December 1970 the USSR Supreme Soviet considered and approved "The Principles of Water Legislation of the USSR and of the Union Republics". This important Act is intended to encourage the more efficient use of water resources and their protection from pollution. "The Principles" determine general lines for the regulation of water balances, as well as the rights and responsibilities of individual water users. The Act determines the conditions for the supply of water for drinking, communal, recreational and other purposes, for the needs of agriculture, industry, hydropower, water transport and timber-rafting and fisheries; it also stipulates the conditions for the discharge of waste water.

40. The entire research work in the country in the sphere of the multipurpose use and conservation of water resources is conducted in conformity with the State research plan. Thus, in conformity with the plan for 1971-1975 dozens of institutes subordinate to industrial branch ministries are enlisted for research into the problems of water conservation and pollution. The co-ordinating and leading institute in this work is the All-Union Research Institute for Water Supply, Sewerage, Hydraulic Structures and Hydrogeologists of the USSR Construction Committee (the VODGEO Institute of the Gosstroï of the USSR). As for the USSR Ministry of Water Economy and Land Reclamation, these problems are the concern of the Research Institute for Water Problems and the Kharkov Laboratories. This comprehensive organization of research facilitates the solution of various problems related to the protection of water bodies from exhaustion and pollution and arising in connexion with their multipurpose use.

41. It should be stressed that in that Soviet Union a complex of measures for preventing water pollution is being worked out and put into effect. The developments are as follows: preventing the discharge of polluted waste water through improvements and changes in production technology, utilization of valuable materials occurring in the waste water, introduction of recycling of industrial water and air cooling, improvement of the existing purification methods, extension of the use of waste water in agriculture, etc. These various measures indicate that in principle the protection of water bodies from pollution by industrial and municipal waste is assured.



42. Pollution resulting from agricultural production is much more difficult to treat. Intensive development of agriculture based on the application of chemical fertilizers, pesticides and on land reclamation has raised three urgent problems in the sphere of water pollution. First, the application in agriculture of nitrogenous and phosphate fertilizers is steadily increasing. Some portion of these fertilizers is leached from the fields and enters the water courses polluting them. What is more, biogene elements, especially in regulated rivers, cause rapid growth of vegetation that subsequently dies resulting in the pollution of water bodies. This is particularly true of blue-green algae. At present we do not dispose of sufficiently reliable control methods for dealing with pollution caused by the application of chemical fertilizers. The measures on the regulation of the use of fertilizers are not efficient either.

43. Secondly, the problem of pollution caused by pesticides is no less complicated. The application of pesticides minimizes the damage caused by pests, diseases and weeds. General prohibition of the use of pesticides would result in tremendous damage to agriculture in all countries. Yet undoubtedly the application of certain pesticides results in the pollution of water bodies and the death of their flora and fauna.

44. The third problem of similar urgency is pollution with the salts washed out when irrigating and leaching farm land.

45. In the Soviet Union these problems are paid much attention to and a number of institutions are seeking their solution. Scientific and technical co-operation among the member countries of the Council for Economic Mutual Assistance is being steadily increased. The solution of the above problems would be definitely speeded up if co-operation between scientists and specialists of all European countries were extended on a regional basis.